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PATENT APPLICATION



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

KOHEI OKAMOTO ET AL.

Application No.: 10/573,308

Int'l Application No. PCT/JP2004/014809

Filed: September 30, 2004

For: PROCESS FOR PRODUCING
THREE-DIMENSIONAL
STRUCTURE

Examiner: Not Yet Assigned

Group Art Unit: Not Yet Assigned

June 2, 2006

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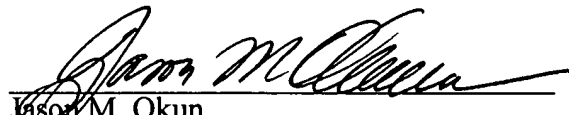
SUBMISSION OF DOCUMENT

Sir:

Enclosed herewith is a copy of the International Preliminary Report on Patentability (IPRP), which was issued by the International Bureau in the above-identified application on April 13, 2006. Applicants note that the IPRP is based on, and includes, a Written Opinion, which was already filed on March 24, 2006. The documents cited in the IPRP have been made of record in the Information Disclosure Statement also filed on March 24, 2006.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address given below.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Jason M. Okun", written over a horizontal line.

Jason M. Okun
Attorney for Applicants
Registration No.: 48,512

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From the INTERNATIONAL BUREAU

PCTNOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)

(PCT Rule 44bis.1(c))

To:

OKABE, Masao
No. 602, Fuji Bldg.
2-3, Marunouchi 3-chome
Chiyoda-ku, Tokyo 1000005
JAPONDate of mailing (*day/month/year*)
13 April 2006 (13.04.2006)Applicant's or agent's file reference
10003088WO01**IMPORTANT NOTICE**International application No.
PCT/JP2004/014809International filing date (*day/month/year*)
30 September 2004 (30.09.2004)Priority date (*day/month/year*)
02 October 2003 (02.10.2003)

Applicant

CANON KABUSHIKI KAISHA et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Yoshiko Kuwahara

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 10003088WO01	FOR FURTHER ACTION	See item 4 below
International application No. PCT/JP2004/014809	International filing date (<i>day/month/year</i>) 30 September 2004 (30.09.2004)	Priority date (<i>day/month/year</i>) 02 October 2003 (02.10.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant CANON KABUSHIKI KAISHA		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input checked="" type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 03 April 2006 (03.04.2006)
Facsimile No. +41 22 740 14 35	Authorized officer <div style="text-align: center; font-weight: bold;">Yoshiko Kuwahara</div> Telephone No. +41 22 338 90 90

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 02 DEC 2004

WIPO

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To:

see form PCT/ISA/220

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing

(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION

See paragraph 2 below

International application No.
PCT/JP2004/014809

International filing date (day/month/year)
30.09.2004

Priority date (day/month/year)
02.10.2003

International Patent Classification (IPC) or both national classification and IPC
G02B6/12

Applicant

CANON KABUSHIKI KAISHA

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/JP2004/014809

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/JP2004/014809

Box No. II Priority

1. ☒ The following document has not been furnished:
- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).
 - ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).
- Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	8
	No: Claims	1-7,9
Inventive step (IS)	Yes: Claims	
	No: Claims	8
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The following documents, cited in the international search report (ISR), are referred to in this communication:
 - D1: XUAN-MING DUAN ET AL: "Micro/nanofabrication of two and three dimensional structures by two-photon polymerization" PROCEEDINGS OF THE 2003 THIRD IEEE CONFERENCE ON NANOTECHNOLOGY, 12-14.08.2003, SAN FRANCISCO, vol. 2, 12 August 2003 (2003-08-12), pages 498-501, XP010657652
 - D2: EP-A-1 089 095 (KABUSHIKI KAISHA TOSHIBA) 4 April 2001 (2001-04-04)
 - D3: MIZEIKIS V ET AL: "Femtosecond laser microfabrication of photonic crystal structures by glass damaging and resin protosolidification" PROCEEDINGS OF THE 4TH PACIFIC RIM CONFERENCE ON LASERS AND ELECTRO-OPTICS, 2001, vol. 1, 15 July 2001 (2001-07-15), pages I302-I303, XP010566130
 - D4: SHOJI S ET AL: "PHOTOFABRICATION OF A PHOTONIC CRYSTAL USING INTERFERENCE OF UV LASER" PROCEEDINGS OF THE SPIE, SPIE, BELLINGHAM, VA, US, vol. 3740, 16 June 1999 (1999-06-16), pages 541-544, XP000997328 ISSN: 0277-786X
 - D5: DONGMIN WU ET AL: "Fabrication and characterization of THz plasmonic filter" PROCEEDINGS OF THE 2002 2ND IEEE CONFERENCE ON NANOTECHNOLOGY, 2002, 26 August 2002 (2002-08-26), pages 229-231, XP010603121
 - D6: WO 02/084340 A (HARVARD COLLEGE) 24 October 2002 (2002-10-24)
 - D8: HUTLEY M ET AL: "Microlens arrays" PHYSICS WORLD, IOP PUBLISHING, BRISTOL, GB, July 1991 (1991-07), pages 27-32, XP002214521 ISSN: 0953-8585
2. The present application does not meet the requirements of Art. 33(1) and 33(2) because the subject-matter of claims 1-7, 9 is not novel:
 - 2.1 D1 discloses a process for producing a periodic structure, comprising the steps of preparing a working object which changes a property thereof by photoreaction

caused by an exciting energy (section II A. second paragraph), generating a light having a photonic energy of intensity of one fraction of natural number divisions of the exciting energy by each of light sources of light source groups arranged regularly in two dimensional arrangement; and concentrating the light emitted from the light source group at each of light concentrating points arranged at regular intervals in the working object to cause photoreaction at and around the light concentrating point to form a periodic structure comprised of regions each of which has a changed property in the working object (section II A. third paragraph).

Therefore the subject-matter of present claim 1 is not novel over the teachings of D1.

- 2.2 The photoreaction according to D1 is a multiphoton absorption reaction (see e.g. title). The light is introduced into the sample through a light-condensing optical system (section II A. third paragraph, line 4).

The light maxima are produced by interference from a single coherent light source (section II A. third paragraph).

Therefore the subject-matter of present claims 2-5 is not novel over the teachings of D1.

- 2.3 D2 also discloses a process for producing a periodic structure, comprising the steps of preparing a working object which changes a property thereof by multiphoton absorption photoreaction caused by an exciting energy, generating a light having a photonic energy of intensity of one fraction of natural number divisions of the exciting energy by each of light sources of light source groups arranged regularly in two dimensional arrangement; and concentrating the light emitted from the light source group at each of light concentrating points arranged at regular intervals in the working object to cause photoreaction at and around the light concentrating point to form a periodic structure comprised of regions each of which has a changed property in the working object (paragraphs [0116]-[119]).

The light maxima are generated by interference of beams from a single coherent light source (column 25, lines 50-58).

A three dimensional periodic structure is formed by changing the relative position of the concentrated points and the working object (column 26, lines 2-29).

Therefore the subject-matter of present claim 1, 2, 4, 5, and 9 is not novel over the teachings of D2.

- 2.4 Similar teachings can be found in D3 (see especially the first and second paragraph).

Furthermore teachings similar to D2 can be found in D4 (see especially Figures 1 and 4 and the corresponding text passages) except for the fact, that the polymerization process according to D4 is not a multiphoton absorption process.

- 2.5 D5 also discloses a process for producing a periodic structure, comprising the steps of preparing a working object which changes a property thereof by photoreaction caused by an exciting energy, generating a light having a photonic energy of intensity of one fraction of natural number divisions of the exciting energy by each of light sources of light source groups arranged regularly in two dimensional arrangement; and concentrating the light emitted from the light source group at each of light concentrating points arranged at regular intervals in the working object to cause photoreaction at and around the light concentrating point to form a periodic structure comprised of regions each of which has a changed property in the working object (see Fig. 1 and corresponding text passages).

Therefore the subject-matter of present claim 1 is not novel over the teachings of D5.

The method according to D5 also uses a light-condensing optical system with a single light source (Fig. 1).

Furthermore the method according to D5 uses a mask with this single light source. It is an intrinsic property of a mask, that it has fine pores and the radiation is introduced to one side and emitted from the other side. From the resulting polymer wire array, it can be seen, that the mask has to be periodic in one plane.

Therefore the subject-matter of present claims 1, 3, 5, and 6 is not novel over the teachings of D1.

- 2.6 D6 also discloses a process for producing a periodic structure, comprising the steps of preparing a working object which changes a property thereof by photoreaction caused by an exciting energy, generating a light having a photonic energy of intensity of one fraction of natural number divisions of the exciting energy by each of light sources of light source groups arranged regularly in two dimensional arrangement; and concentrating the light emitted from the light source group at each of light concentrating points arranged at regular intervals in the working object to cause photoreaction at and around the light concentrating point to form a periodic structure comprised of regions each of which has a changed property in the working object (see Figs. 6, 7 and page 41, lines 16-31).

The light intensity distribution according to D6 is generated by a single light source and a microlens array (Figs. 6, 7)

Therefore the subject-matter of present claims 1 and 7 is not novel over the teachings of D6.

3. Furthermore, the present application does not meet the requirements of Art. 33(1) and 33(3) PCT because the subject-matter of claims 8 does not involve an inventive step.

The subject-matter of claim 8 differs from the teachings of D6 in that the light from the light source is guided to the sample through a fiber bundle with microlenses at the end.

However using such fiber bundles for guiding illuminating light from a source to a sample is well-known and commonly used in the art of fiber optics (see e.g. D8, Fig. 11).

The skilled person would therefore use such a fiber for guiding light from the source to the sample in order to increase flexibility of the arrangement of the sample with respect to the source, thereby directly arriving at the subject-matter of claim 8.

Therefore the subject-matter of claim 8 does not involve an inventive step.

Re Item VIII

Certain observations on the international application

The application does not meet the requirements of Article 6 PCT, because claim 1 is not clear.

The phrase "generating a light having a photonic energy of intensity of one fraction of natural number divisions of the exciting energy by each of light sources of light source groups arranged regularly in two dimensional arrangement" leaves the reader in doubt, whether the exciting light is generated by a single light source focussed into the sample at different locations or by multiple light sources focussed into the sample.

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